

REMARKS

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office action, and amended as necessary to more clearly and particularly describe the subject matter which applicant regards as the invention.

The Examiner objected to the title for not being descriptive. The title has been amended so as to meet the Examiner's requirement and remove the grounds for objection. Withdrawal of the objection is requested.

Further, the Applicant thanks the Examiner for pointing out the grammatical error in claim 4. Claim 4 has been cancelled.

Claims 1-6 were rejected under 35 U.S.C. 102(b) as being anticipated by Arakawa et al. (U.S. Patent No. 4,497,875). The rejections are traversed for the following reasons.

The invention defined in claim 1 is directed toward a semiconductor device. The device includes a semiconductor element and a first metal plate, where the first metal plate is bonded to one side of the semiconductor element. An intermediate layer formed of a carbon-copper composite material is bonded to a side of the first metal plate opposite to the side the semiconductor element is bonded. A second metal plate is bonded to the side of the intermediate layer opposite the side the first metal plate is bonded on. An insulating layer is bonded to a side of the second metal plate that is remote from the side of the second metal plate where the intermediate layer is bonded. A third metal layer is bonded to the remote side of the insulating member. The second and third metal plates have substantially equal

thicknesses. Further, the first, second, and third metal plates are made of the same material.

Arakawa teaches a semiconductor device having a semiconductor element (73) bonded to a metal plate (23). The metal plate (23) has a copper coating film (63) disposed on a top surface thereof, with the top surface being bonded to the semiconductor element (73) through a brazing layer (83). The bottom surface of the metal plate (23) is bonded to a top surface of an insulating plate (1) through a brazing layer (33). The bottom surface of the insulating plate (1) is bonded to a heat sink (5) through a brazing layer (4).

The Applicant asserts that the Arakawa patent fails to teach all features recited in claim 1, and therefore fails to anticipate the claim. Initially, the Examiner cites to brazing layers (33, 4) as teaching the second and third metal plates of claim 1. The metal plates of the present invention are provided for the purpose of dissipating heat, while the brazing layers of Arakawa are provided for bonding purposes. It is asserted that one skilled in the art would recognize the difference between a bonding filler material (such as a brazing layer) and a metal plate. Therefore, it is asserted that the brazing layers of Arakawa fail to teach the metal plates of claim 1. For this reason alone, claim 1 is considered to be allowable over the art.

However, if the brazing layers of Arakawa could properly be interpreted as teaching metal plates, Arakawa would still fails to teach all features of claim 1. Particularly, claim 1 requires that "the first, second, and third metal plates are made of the same material". The Examiner looks to the copper coating film 63 and the brazing layers 33, 4 as teaching the first, second and third metal plates of claim 1.

Arakawa specifically discloses that the copper coating film (63) and the brazing layers (33, 40) are not made of the same material. Further, one skilled in the art of brazing would recognize that not all brazing layers are necessarily made of the same material. Rather, the material forming a brazing layer is chosen so as to be a material that will provide a desired bonding strength between different metals. Therefore, the brazing layers of Arakawa are not necessarily formed of the same material, and, in the absence of further definition, do not teach plates made of the same material. Consequently, Arakawa fails to teach first, second, and third metal plates made of the same material.

Further, Arakawa fails to teach that the first metal plate is "bonded to one side of the semiconductor device" and also has "an intermediate layer bonded to one side ... remote from the semiconductor element", as required by claim 1. To simplify, claim 1 recites that the first metal plate is bonded to the semiconductor device on one side (hereinafter, a top side) and is bonded to the intermediate layer on the opposite side (hereinafter, a bottom side). Arakawa does not teach such a structure.

If brazing layers teach metal plates, as asserted by the Examiner, then Arakawa teaches a metal plate (brazing layer (83)) disposed between the first metal plate (copper coating film (63)) and the semiconductor element (73). Thus, contrary to the Examiner's assertion, the copper coating film (63) is bonded to a metal plate (the brazing layer (83)), with the metal plate (brazing layer (83)) being bonded to the semiconductor element (73). Arakawa does not teach the first metal plate (copper coating film (63)) being bonded to the semiconductor element (73) itself.

For these reasons, it is asserted that Arakawa fails to teach all features of

claim 1, and therefore does not anticipate claim 1. Reconsideration and withdrawal of the rejection is requested. Claim 2 depends from claim 1 and is therefore likewise considered allowable over the art. Claims 7-10 and 15 have been added for consideration. These claims depend from claim 1 and are therefore considered to be allowable over the art. Favorable consideration of claims 7-10 and 15 is requested.

Claim 3 has been amended to include the features of claim 4, and claim 4 has been cancelled. Like claim 1, claim 3 requires the metal plates be directly attached to the similar semiconductor device components (the semiconductor element, the intermediate layer, the insulating member). Therefore, the arguments presented above in favor of the patentability of claim 1 also apply to claim 3. For the sake of brevity, the arguments will not be repeated, but are hereby incorporated in full.

Thus, claim 3 is considered to be allowable over Arakawa. Reconsideration and withdrawal of the rejection is requested. Claims 5 and 6 depend from claim 3, and are likewise considered allowable over the art. Claims 11-14 and 16 have been added to the present application. These claims depend from claim 3 and are likewise considered allowable over the art. Favorable consideration of claims 11-14 and 16 is requested.

In light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 18-0160, our Order No. SHM-16366.

Respectfully submitted,

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